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5-INCH B.L. HOWITZER. GUN DRILL.

1915.



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GUN DRILL FOR 5-INCH B.L. HOWITZER.

GENERAL INSTRUCTIONS.

Preliminary instruction in the equipment should be given practically to each recruit before any attempt is made to instruct him in Section Gun Drill.

As soon as he is conversant with all parts of the equipment, and can handle in the best and quickest manner each of the working parts of the gun, instruction in Section Gun Drill should be commenced.

This instruction should take the form of practical demonstrations dealing with the work of each man of the detachment, and all men under instruction should, in turn, carry out the work of each particular number in the detachment.

Once the work of each number has been thoroughly mastered, it should not take long for the recruit to learn the actual drill.

It is most important that a marked distinction should be drawn between *instruction* and *drill*.

During the former the language used should be as simple as possible, and the meaning of all technical terms which are necessary must be carefully explained. A conversational tone should be adopted, and under no circumstances whatever must anything in the nature of long-winded quotations from drill books, &c., be allowed. The men should be permitted to assume an easy attitude and their interest should not be allowed to flag. They should be encouraged in the fullest possible degree to ask questions.

At drill, on the contrary, the most rigid discipline must be maintained, orders must be clear, decisive and emphatic, and the detachments made to work steadily, smartly and rapidly. At the same time the utmost accuracy is essential, and any deviation from the methods laid down must be at once strictly checked.

The following instructions are arranged so that all work carried out by each individual member of a detachment is grouped together. Those paragraphs marked with an asterisk should not, however, be taught until the drill has been learnt.

DETAILED INSTRUCTIONS FOR GUN DETACHMENTS.

The detachment consists of 10 men, 7 of whom work in the firing battery, the remainder forming a reserve.

The duties of each particular number are as follows :—

No. 1.

1. Before leaving the gun park he must satisfy himself that the equipment of his sub-section is complete in every respect—reporting the fact to his section commander.

2. He must examine the buffer and see that it is properly filled. To do so he should place the cradle in the horizontal position, remove the filling hole plugs, and see if the oil shows at the filling holes ; if not, more oil should be poured in until it does show ; the plugs should then be replaced.

He must be careful to ascertain that oil is not leaking from the buffer, either through the glands or the front plugs. A leakage of oil is liable to cause a serious accident to the equipment during firing. If any leakage of oil takes place at the glands or front plugs they should be tightened ; if this will not stop the leak at the former, the packing must be renewed ; if at the latter, the lead washer must be replaced. Great care must be taken that no dust or gritty matter is poured in with the oil.

3. He only gives the words of command shown for him in Section Gun Drill. His executive orders should be no louder than is necessary for his sub-section to hear, but when assisting to pass orders down the battery, they should be given out sufficiently loud to ensure them getting through.

4. He must acknowledge all orders affecting his sub-section by saluting, also any orders that he may be required to pass down the battery. The salute must be given accurately and unmistakably so that it may be plainly seen.

5. He is responsible that the most suitable ground available is selected for his gun.

6. He should ram the shell vigorously home with a good "travel" to prevent it slipping back when the gun is elevated.

To ram home :—He should grasp the traversing handspike about the middle with the left hand, back of the hand up, withdraw it from its socket, swing the thick end to the rear, catching it with the right hand ; place the copper shod end against the base of the shell and ram the shell home with the whole weight of the body. He then steps back and places the handspike in its socket.

7. When his gun is in action in the open he must ascertain at the first opportunity the target or reference point ; also the aiming point or auxiliary aiming point used by the layer, both when in the open and under cover.

8. It is of the greatest importance that this howitzer should have a level platform. If such a platform is not available, the first opportunity must be taken to level it by lowering the ground occupied by the higher wheel. The trail must have a firm bearing on the ground.

9. He lays for direction, as nearly as possible, by looking along the gun and moving the trail by means of the traversing hand-

spike, final adjustment being made as directed by signals from 4. When a new line has been ordered he should measure the switch with his hand and move the trail so that the gun is pointing as nearly as possible in the new line.

10. As soon as the gun is fired it should be run up, without further orders, to its marked position and relaid for direction. This should be done without waiting for orders.

No. 2.

1. He is responsible that the brake is always put on when in action. When examining the brake on the near side at "preparation for action" he should take it off its hook and place it in position behind the wheel. If the brake is not likely to be required as a travelling brake the section commander may order the chain on the wire rope to be shortened to the firing position. If the brake is not actually put on the wheel, it is often found, on coming into action, that the rope is twisted and that the ram's horn hook is closed up and will not go on the drag washer. To replace the drag-shoe, place the last link of the chain on the drag-shoe hook, turn the sole of the shoe outwards when raising it, and hang the shoe on the hook, sole to the rear. In putting the brake on in the firing position this operation is reversed.

2. When manning the wheel to move the gun forward he should grasp the spoke which is nearest to the horizontal with his left hand, and the fourth one from it to the front with his right hand. The spokes should be grasped as near the felloe as possible.

3. When there is a change of target he must always be ready to assist 1 by manning the right wheel if required.

4. If the aiming point is in rear he must assist 4 by laying for direction.

5. He fires the gun at the order from 1. To fire, he hooks the lanyard to the tube, passing the lanyard between the spokes (and through the hole in the bracket of the carriage should the elevation of the gun render it necessary). He then steps outside the wheel and stands facing the breech, holding the lanyard with his right hand. When 1 sees that 2 is ready he orders "fire." 2 then jerks the lanyard smartly, and places the lanyard round his neck.

6. He should see that the vent is always kept clear.

7. When inserting the tube he should hold it between the thumb and first finger of the left hand.

8. When hooking the lanyard to the tube he takes the lanyard from round his neck, holds the extractor in the right hand and the hook in the left, back of the hook down.

No. 3.

1. He examines and attends to the brake on his own side, taking the same precautions as laid down in paragraph 1 of 2's duties.

2. He attends to the cross level and should see that the scale is

always at zero, and that the bubble is central while the gun is being laid for direction.

3. If the aiming point is to the right front he must assist 4 by laying for direction.

4. He opens and closes the breech as follows :—

To open the breech—

He takes hold of the cam lever with his right hand, releasing the lever catch with his right thumb, raises it to its full extent, draws it to him as far as it will go, using both hands, partly folds it down with the left hand until the breech screw is started, then raises it to its full extent, and at the same time throws the breech open by the loop with his right hand.

To close the breech—

With his left hand he releases the catch on the right of the breech, takes hold of the cam lever with his right hand, swings the breech screw and carrier ring round until the carrier ring touches the breech; he then grasps the lever with his left hand, keeping it raised, and with the palm of his right he pushes the breech screw home, forcing the lever from him as far as it will go, then folds it down, seeing it is secured by its catch.

5. He uncaps the fuze and withdraws safety pins as necessary. The percussion pin must be withdrawn by a direct pull, but with fuze 82 the time pin must be pulled slightly to the left, *i.e.*, towards the left shoulder. With other time fuzes the time pin is withdrawn by a direct pull. He should always do this before receiving the round.

6. As soon as the shell has been rammed home he places the cartridge in the chamber, rings to the front.

No. 4.

1. He examines the sight at "preparation for action." To examine the sight it should actually be put on the gun, the deflection and cross-level scales set at zero, and the elevation drum set to about 25°.

2. He lays for elevation always, and for direction except when the aiming point is in rear or to the right front.

3. When laying indirect the sequence should be as follows :—

- i. Set the sight as ordered.
- ii. Lay for elevation.
- iii. Lay for direction.
- iv. Lay for elevation once more.

4. When laying for direction his eye should be kept about 12 inches from the back sight of the sighting tube. Signals should be made with the left hand to 1, the palm showing the direction in which the trail should be moved.

5. When laying for elevation the left hand should be on the

elevating handwheel, and the right hand on the jamming lever ; as soon as the bubble is central, the jamming lever should be pressed hard down so as to clamp the elevating gear. He must remember that, to give elevation, he must turn the elevating handwheel to the right. Similarly in setting the sight, turning the drum to the right (clockwise) gives elevation. RIGHT—RAISE. One complete turn of the elevating handwheel gives approximately 5° elevation or depression.

6. Great care is required in setting the vernier. •

- i. Set the arrow to the number of degrees ordered.
- ii. Note the line on the vernier representing the number of minutes (if any) ordered.
- iii. Move the vernier until this line coincides with the next degree graduation on the ring.
- iv. If the angle ordered is right the vernier is moved to the right, and *vice versa*.
- v. When set, the sight must be held with the left hand and the clamping nut tightened with the right.

7. After firing he should always bring the gun to a convenient position for loading as soon as the laying for direction is completed.

8. The sight must always be removed from the gun before firing, but special care must be taken, during this operation, that neither of the gears is touched nor the gun moved in any way.

No. 5.

1. In order to obtain as much cover as possible, 5, 6, and 7 will work in a kneeling position.

2. When in action, four rounds per gun must be always available for immediate use, and charges prepared. If firing is likely to be continuous a larger supply should be available.

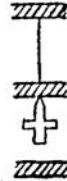
3. He should fuze lyddite shell in action and set time fuzes, clamping them as tight as possible ; to do this he should use the fuze key with the right hand. When the round is ready he places it in a convenient position for removal by 6 or 7.

4. The rapid supply of ammunition to the gun is most important. This can only be maintained if there is a good mutual understanding between 5, 6 and 7.

5. As soon as the wagon halts alongside the gun in action, he dismounts and opens the ammunition box.

6. When it becomes necessary to replace ammunition in the boxes at "Cease Firing," 5, 6 and 7 are responsible that all fuzes are removed from lyddite shell. Rings of unexpended cartridges which have been prepared will be replaced. Shrapnel shell should have their fuzes set at safety.

To set a fuze at "safety," the safety mark on the graduated scale and the vertical line on the setting ring must exactly coincide, thus :



In case of a change of position, if these duties have not been completed when the wagon team arrives, 5 carries on while 6 and 7 hook in.

7. With Mark II wagons, when the ammunition in the rear of the wagon body is expended, the wagon will be run back so that the axletree of the limber is one yard in front of the axle of the gun, the perch lowered to the ground and the ammunition supplied from the front of the wagon.

Nos. 6 and 7.

1. They prepare charges as ordered and supply 3 with ammunition alternately.

2. When supplying 3 with ammunition the shell should be carried in both hands, fuze to the right, the cartridge being carried under the left arm. Whichever of them has supplied the last round to 3 should remain ready to assist in running up. In doing so he should push at the breech and not assist 1 with the traversing handspike.

3. All keys should be attached by their lanyards to the leather loops inside their pockets.

*CASUALTIES TO SIGHTS.

Dial Sight.—If the dial sight becomes a casualty the line of fire can be obtained as follows:—

For angles up to 45° from the aiming point—set the field clinometer to the angle ordered and place it horizontally against the outer side of the top fellow of the left gun wheel.

For right deflection the pivot pin must be to the rear (RIGHT—REAR).

For left deflection the pivot pin must be to the front.

Look along the edge of the slider and direct the gun so that the edge of the slider and aiming point are in line. Aiming posts should now be planted in line with the bar sight set at zero, or an auxiliary aiming point picked up. Deflection for level of wheels must be placed on the bar sight if necessary.

If the angle is from 45° to 135° the clinometer should be placed on the face of the breech set as follows:—

For angles between 45° and 90°—Subtract the angle from 90°
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and set the clinometer to the result obtained, the pivot pointing to the side of the aiming point.

For angles between 90° and 135° —Subtract 90° from the angle ordered and set the clinometer to the result obtained, the pivot pointing away from the aiming point.

For angles between 135° and 180° —Subtract the angle ordered from 180° , set the clinometer to the result obtained, and place it horizontally against the outer side of the top felloe of the left gun wheel. Pivot towards breech for Right and towards muzzle for Left.

If the cross level is broken, the field clinometer set at zero should be placed transversely on the degree scale ring carrying plate and the latter levelled by the cross levelling screw.

***TO CALCULATE DEFLECTION REQUIRED FOR DIFFERENCE IN LEVEL OF WHEELS.**

Number of degrees of elevation \times number of inches or degrees difference in level of wheels = number of minutes deflection to be given on the side of the higher wheel.

GUN DRILL.

The general principles of battery tactics, which vary but little with the different equipments, are laid down in "Field Artillery Training."

The following paragraphs give the duties of the detachments at the section commander's orders.

Single detachments should be accustomed to drill as if forming part of a section, and the instructor should therefore always use the orders given for the section commander.

The Detachment.

The detachment consists of 10 men. The senior non-commissioned officer is 1, and is in charge of the sub-section.

The detachment falls in two deep, one pace between ranks, 1 on the right of the front rank, and when at "Detachment Rear" is formed three yards in rear of the muzzle, 1 covering the off wheel.

To Tell Off.

*At the order from the section commander " . . . Section—Tell Off"—*1 numbers himself 1; the right hand man of the rear rank 2; the right hand man of the front rank 3; the second man from the right of the rear rank 4; his front rank man 5; and so on.

Positions when Mounted.

1 and 10 on their horses, when limbered up, usually on the left of the gun and wagon leaders respectively; 2 and 3 on the gun

limber ; 6 and 7 on the limber, 4 and 5 on the body of the firing battery wagon ; 8 on the limber, 9 on the body of the first line wagon. Even numbers on the near side, odd numbers on the off side.

With Mark II wagons, when only firing battery wagons are on parade, 8 and 9 will be mounted on the wagon body facing the rear.

To Mount.

*At the order from the section commander " . . . Section—Detachments Prepare to Mount"—*The men double to their places at the carriages ; 2, 5, 6, 8 and 9 lay hold of the guard iron with the left hand, placing the inner foot on the trail, perch or spoke ; 3, 4 and 7 lay hold of the guard iron with the right hand, placing the inner foot on the trail, perch or spoke.

*At the order "Mount"—*The whole spring into their places ; the men on the limbers turn round to the front, lifting their feet close together and throwing them over the guard irons.

They sit upright, holding the handstrap with the inward hand, and the guard iron with the outward hand. This is the position at "Attention."

When going over rough ground they should slightly raise themselves to avoid being jolted.

*At the order "Sit at Ease"—*The men on the carriages place the outward upon the inward hand and sit well back.

To Dismount.

*At the order from the section commander " . . . Section—Detachments Prepare to Dismount"—*All the men except 4, 5 and 9 turn to the rear, throwing their legs over the guard iron ; 4, 5 and 9 stand up.

*At the order "Dismount"—*The whole jump off and form detachment rear.

To Move the Gun with Dragropes when Limbered Up.

*At the order from the section commander " . . . Section—With Dragropes, Prepare to Advance"—*2 and 3 hook the dragropes to the gun-wheel washers ; the two highest numbers go to the pole and the remainder man the ropes. Even numbers on the near side, odd numbers on the off.

*At the order "Walk March"—*the carriages are moved to the front.

*At the order "Halt"—*the carriages are halted and the detachments remain at their posts.

*At the order "Detachments Rear"—*2 and 3 replace the dragropes and the detachments double to their places by the shortest way and halt.

To Move the Gun without Dragropes when Limbered Up.

At the order from the section commander " . . . Section—Without Dragropes, Prepare to Advance"—2 and 3 push between muzzle and wheels; 4 and 5 man the gun wheels; the two highest numbers go to the pole and the remainder assist, even numbers on the near side, odd numbers on the off.

At the order "Walk March" the carriages are moved to the front.

At the order "Halt" the carriages are halted and the detachments remain at their posts.

At the order "Detachments Rear" the detachments double to their places by the shortest way and halt.

To Move the Gun with Dragropes when Unlimbered.

At the order from the section commander " . . . Section—With Dragropes, Run Up"—2 and 3 hook the dragropes to the gun wheel washers; 1 mans the traversing handspike, and the remainder the dragropes.

Preparation for Action.

At the order from the section commander " . . . Section—Prepare for Action"—1 and the detachment, if mounted, dismount, and—

1 sees that the bore is clear, superintends the other men, and satisfies himself that the gun and carriage are in all respects ready for action.

2 fills the tube pocket, sees that the lanyards are in their pockets, and examines the brake.

3 removes the breech and muzzle covers and straps them to the top transom of the carriage, examines the breech fittings and brake.

4 examines the sights, elevating and jamming gears.

5 examines the gun limber box and sees that the fuze keys are in their pockets.

6 examines the wagon limber box.

7 examines the wagon box.

8 examines the limber box of the first line wagon.

9 examines the wagon box.

The men who examine the ammunition boxes fuze shell as ordered, and see that the time fuzes are set at "safety."

As the fuzes are liable to deteriorate rapidly when unprotected from damp, it is important that only such as are required for immediate use should be uncovered.

Breech and muzzle covers may be replaced if necessary.

Each man resumes his place as soon as he has completed his duties.

Action Front.

At the order or signal from the battery leader or section commander "Halt, Action Front"—1 orders "No.... Halt, Action Front."

At the order from 1—The detachment dismounts, 3 unkeys and with 2 lifts the trail; when the trail is clear of the hook, 3 orders "Limber Drive On."

On dismounted parades, 6, 7, 8 and 9 will attend to the limber, 6 and 7 pushing in rear, 8 and 9 at the pole.

The limber advances one yard, wheels to the right-about at a trot, and proceeds direct to the wagon line.

2 and 3 carry the trail round a half-circle to the right (3 shifting round the trail-eye to avoid walking backwards), and lower it to the ground.

4 and 5 man the wheels.

As soon as the trail of each gun is on the ground, its wagon will drive up on its left and halt with the axletree of the wagon body in line with the axletree of the gun, and not more than one yard to a flank.

When the battery is coming into action under cover and the line of fire has to be obtained, no wagon should drive up to its gun until the latter is in the correct line, when 1 will give the signal "Advance."

6 and 7 immediately unhook, 5 puts on the brake and prepares ammunition.

The position of the detachment is as follows:—

1 one yard in rear of the trail-eye.

2 outside the wheel in line with the breech on the right side.

3 close to and facing the breech on the left side.

4 in line with the trail handle on the right side.

5 in rear of the wagon, on the side furthest from the gun.

6 and 7, alternately, in rear of the wagon, on the side nearest to the gun.

8 and 9 remain with the first line wagons. They assist in the supply of ammunition, and replace casualties in the firing battery as ordered.

At standing gun drill, when no first line wagons are present, they take post six yards in rear of their gun.

As soon as the detachment is in position orders will be given regarding the reference point, target, aiming point, deflection, charge, projectile and elevation.

1 ships the handspike, lays approximately for direction, and points out the target or aiming point to 4.

2 takes the lanyard out of the tube pocket, and, as soon as the gun has been laid for direction, puts on the brake and marks the position of the right wheel.

3, as soon as the gun has been laid for direction, puts on the brake, marks the position of the left wheel, and opens the breech.

4 fixes and adjusts the sight, and the gun is laid for direction.

5, assisted by 6, prepares to issue ammunition, and fuzes two lyddite shell.

Action Right, Left and Rear are the same except that at—

Action Right—

The trail is carried round a quarter of a circle to the left, 2 shifting round the trail-eye.

Action Left—

The trail is carried round a quarter of a circle to the right, 3 shifting round the trail-eye.

Action Rear—

The trail is not carried round.

When on a "side slope," *Action Front* or *Action Rear* only should be resorted to, and in the former case the trail should always be carried round downhill.

To Form Detachment Rear in Action.

At the order from the section commander " . . . Section—Detachments Rear"—1 doubles to his place (three yards in rear of and covering the right wheel) and gives the order "No. . . . Double March."

At the order from 1—The remainder double to their places by the shortest way and halt.

To Take Post from Detachment Rear in Action.

At the order from the section commander " . . . Section—Take Post"—1 orders "No. . . . Double March."

At the order from 1—The detachments double to their places by the shortest way and halt.

General Duties in Action.

1 commands and is responsible for the entire service of the gun. He rams home and attends to the traversing handspike, but will not touch it once the gun is laid. He assists in passing orders down the battery when necessary. He will occasionally examine the settings on the sights and fuze.

2 lays for direction when the aiming point is in rear, attends to aiming posts if in use, brake and vent, fires and mans the wheel.

3 attends to the cross level, and if the aiming point is on the right front lays for direction, attends to the brake and breech, loads, and mans the wheel.

4 lays, attends to the elevating and jamming gears and sights.

5 fuzes lyddite shell in action and sets time fuzes.

6 and 7 prepare charges as ordered, assist 5, supply ammunition, and assist in running up.

If the ground is heavy, 8 and 9 may be sent to the gun to assist in running up.

To Load.

At drill only drill cartridges will be placed in the bore.

The rammer will be placed against the breech ring to represent the action of ramming home.

At the order from 1—"No. . . . Full Charge (or Core and . . . Rings), Percussion Load," 6 or 7 supplies the round to 3.

3 removes the percussion pin, before receiving the shell, and places the shell in the breech.

1 rams the shell hard home.

3 then places the cartridge in the chamber, closes the breech, and holds up the cam lever, while 2 inserts a tube.

4 lays, assisted by 2 or 3 if necessary, and as soon as the laying is completed removes the sight and reports "Ready."

At the order from 1—"No. . . . Full Charge (or Core and . . . Rings) Lyddite Load," the duties are the same as for loading with percussion except that 3 uncaps the fuze.

At the order from 1—"No. . . . Full Charge (or Core and . . . Rings) Fuze . . . Load"—the duties are the same as for loading with percussion, except that 5 sets the fuze as ordered, and 3 withdraws both safety pins.

5 follows up with another fuze. When there is no alteration of fuze or charge for subsequent rounds, 1 will order "Time Load."

To Fire.

A gun is not to be fired without an order from 1, who must never give this order until he sees that the gun is in all respects ready.

As soon as the gun is reported ready and its turn comes to fire, 1 steps clear of the recoil to the left and gives the number of his gun as a caution.

At the caution from 1—

2 hooks the lanyard to the tube, steps outside the wheel, and stands facing the breech, holding the lanyard with his right hand.

3 and 4 step clear of the recoil.

As soon as he sees 2 ready and the other men clear, 1 orders "Fire."

At the order from 1—

2 fires the gun and places the lanyard round his neck.

Directly the gun stops in its recoil—

4 replaces the sight in its socket, relays for direction as soon as the gun is run up, and depresses the gun to the loading position.

3 opens the breech.

2 takes out the old tube.

Missfire.

If there is a missfire,* after an interval of 10 seconds the detachment resume their positions, 2 takes out the old tube and puts in a new one.

* It is not a missfire if the wire breaks and the friction bar is not drawn.

Should missfires continue the breech may be opened, but an interval of three minutes must be allowed to elapse after the last failure to fire the gun before doing so. Wait one minute longer before removing the cartridge. Examine igniter; if correct, use cartridge again; if smouldering, throw it clear.

The precautions to be taken when firing blank ammunition are detailed in Appendix II, "Field Artillery Training."

No gun is to be reloaded within 30 seconds after firing, nor until 1 has examined the bore.

Battery, Section, or Gun Fire.

At the order from the battery commander the gun is loaded by order of 1, fired in its turn at the interval ordered, and reloaded as required.

To Stop Firing.

At the order "*Stop*," the detachment will continue their duties, but the gun must not be fired until the order "*Go on*."

To Stop Loading.

At the order "*Stop Loading*," the detachment will continue their duties, but the gun must not be loaded until the order "*Go on*."

To Stand Fast.

At the order from the section commander, ". . . Section—*Stand Fast*," all stand fast, whatever they are doing; if the lanyard is attached to the tube, it is unhooked. At the order "*Go on*," the work is continued.

Casualties to Detachment.

Men sent up to replace casualties will report themselves to their section commanders, who will order such changes of duties in their section and detachments as they consider necessary.

If the full detachment cannot be maintained, the duties are divided as follows:—

With six men—6 performs the duties of 6 and 7.

With five men—2 performs the duties of 6 and 7, 1 the duties of 1 and 2.

With four men—2 performs the duty of 5, 3 performs the duties of 3, 6 and 7, 1 the duties of 1 and 2, 4 no change.

To Cease Firing.

Before giving the order to cease firing, guns must be emptied.

At the order from the section commander ". . . Section—*Cease Firing*"—

1 straps the handspike on the trail.

2 takes off the brake, puts the lanyard in the tube pocket and brings in aiming posts if in use.

3 takes off the brake and closes the breech.

4 replaces the sight in its case, brings the gun into a horizontal position and clamps the jamming gear.

5, 6 and 7 remove fuzes from lyddite shell, reset time fuzes at safety, replace unexpended ammunition and close all lids.

To Limber Up.

At the order from the section commander ". . . Section—Front Limber Up," 2 and 3 carry the trail round half a circle to the right (2 shifting round the trail-eye to avoid walking backwards) and lower it to the ground.

4 and 5 man the wheels.

As soon as the trail is lowered the detachment gets under cover. 1 in front of 2.

2 and 3 between breech and wheels.

4 and 5 between muzzle and wheels.

The whole with their backs to the axletree.

The limber comes up on the right of the gun and one yard clear. When clear of the gun wheel it inclines to the left till the near wheel of the limber has just passed the trail-eye. 1 then orders "Halt." The limber is halted, squared, and when square, 1 orders "Limmer Up." When the wagon team comes up it will be immediately hooked in by 6 and 7; 2 and 3 lift the trail and place it on the hook; 4 and 5 man the wheels; 3 keys up. The detachment mounts without further orders.

Right, left, and rear limber up are the same except that at—

Right limber up—The trail is carried round a quarter of a circle to the right, 2 shifting round the trail-eye.

Left limber up—The trail is carried round a quarter of a circle to the left, 3 shifting round the trail-eye.

Rear limber up—The trail is not carried round.

*To Change a Damaged Wheel.

Should a gun wheel be damaged in action, it should be immediately turned so as to bring the sound portion on to the ground, and notice sent to the captain. The latter will immediately send up another wheel, which will be brought alongside the damaged one, and the wheels changed. To take the weight off the carriage while the wheel is being changed, a lifting jack may be used, or the carriage may be raised by four men lifting at the damaged wheel (backs to the wheel). As soon as the carriage is raised high enough, a swingletree is placed with one end under the axletree bracket to which the tensile stay is attached, and the other end on a 6-foot handspike laid parallel to the wheel. This prevents it sinking in on taking the weight, and gives the necessary height. The swingletree acts as a vertical support while the wheel is being changed.

Should the wheel be damaged in such a manner that the axletree arm has fallen to the ground, the axletree can be raised above the horizontal by means of the limber as follows :—

Place a limber so that its hook comes over the point of the axletree and the pole at right angles to the gun. Secure one drag-rope on the double round the pole near the tug ; then hook a second dragrope round the pole near the footboard ; pass the end of this rope over the limber box, round the axletree, and back over the box. The lynch pin can be left in to prevent the rope slipping. Raise the limber pole about 60°, taking care that the wheels do not run forward, then take in the slack on the dragrope, and take three turns round the pole with the running end. The axletree can now be raised by five men pulling down on the dragrope on the front of the pole, and as soon as it is raised high enough the swingletree can be placed in position to support the carriage while the new wheel is put on.

***Change of Target.**

The dial sight is immediately laid on an aiming point, or auxiliary aiming point, and the angle noted. The switch angle is added to or subtracted from this angle, and the dial sight reset at the angle thus obtained. The dial sight is relaid on the aiming point by moving the trail, and aiming posts planted (if required) in line with the dial sight.

***Parallel Lines to a Named Gun.**

The named gun, being on the required line, will not be moved ; then, using the dial sight of this gun as a director, the subsequent procedure is as in Section 198, "Field Artillery Training."

***Laying by Means of Aiming Posts.**

On the order "*Lines of Fire*," 2 doubles out about 50 yards in front of the gun with his two aiming posts, and plants them as directed by 4 in line with the dial sight. In planting the aiming posts, the one nearer the gun will be planted first.

When lines of fire are given to individual guns from a director in front of the battery, 2 will kneel down and, as soon as he has received the angle for his gun, will stand up, salute, and pass on the order to 4.

If new "lines of fire" are ordered, 2 will go to the far aiming post, and on a signal from 4, pick it up. He then picks up the near one and proceeds to replant them as above.

When laying out the line, the dial-sight may be at any elevation, preferably the quadrant angle at which fire is to be opened, but the aiming posts must be planted with the sight at the same elevation as when it was directed on the aiming point or director.

Aiming posts may be planted with the arrow on the vernier at 0° or at any other lateral angle ; 25° right is a convenient position for 4.

***To Ascertain the Lowest Quadrant Elevation that will Clear the Crest or Intervening Obstacle.**

Lay on the crest along the bottom of the bore, and bring the bubble of the longitudinal level to the centre by moving the sight drum, when the reading will be the angle of sight to the crest. Make a liberal estimate of the range to the crest, and convert it into degrees for the charge to be used, add this angle to the angle of sight found to the crest, and the result will be the lowest quadrant elevation that will clear the crest.

***Use of Crossbar Sights.**

As a rule these sights will be used for laying for direction only, elevation being given by means of the clinometer. The sights must be removed before firing.

For Forward Laying.

Place the notch on the sliding leaf of the tangent sight and the point on the sliding leaf of the foresight uppermost, and set both sliding leaves at the third graduation on the bar, put on the deflection ordered by sliding the crossbar of the tangent sight to the right for right deflection or to the left for left deflection, and lay the gun on the target, aiming point, or aiming posts, by moving the trail as required.

For Reverse Laying.

Place the point on the sliding leaf of the tangent sight and the notch on the sliding leaf of the foresight uppermost, and set both sliding leaves at the third graduation on the bar, put on the deflection ordered by sliding the crossbar of the tangent sight to the right for right deflection or to the left for left deflection, and lay the gun on the aiming point or aiming posts by moving the trail as required.

***INSTRUCTIONS FOR TESTING AND ADJUSTING SIGHTS IN THE FIELD.**

To Test Dial Sight, No. 3, Mark II, for Elevation.

Before any of the following operations are carried out, the carriage should be placed on a firm platform, or on hard level ground, and the howitzer levelled by means of a clinometer.

The bubble of the longitudinal level should be in the centre of its run when the elevation drum is at zero.

Test.—Set the elevation drum at zero. The bubble of the longitudinal level should be in the centre of its run.

Adjustment.—Loosen the capstan-headed nuts at the ends of the longitudinal level; turn them until the bubble is in the centre of its run; tighten the nuts.

To Test the Cross-level.

The bubble of the cross-level should be in the centre of its run when the top bearing surface of the "plate, carrying degree scale ring" is horizontal, and the elevating drum and the deflection scale reader are at zero.

Test.—Set the drum and deflection scale at zero. Place the clinometer, set at zero, on the "plate, carrying degree scale ring," at right angles to the axis of the gun, and with the cross-levelling screw raise or lower the plate until the bubble of the clinometer is in the centre of its run. The bubble of the cross-level should then be in the centre of its run.

Adjustment.—Loosen the capstan-headed nuts at the ends of the cross-level; turn them until the bubble is in the centre of its run; tighten the nuts.

Alignment Tests.

In order to carry out the tests for alignment, it is necessary to obtain a line of sight along the axis of the bore of the howitzer. A point at the muzzle is obtained by stretching two fine cords along the vertical and horizontal axis lines cut on the muzzle of the howitzer, their point of intersection being on the axis line. The axial vent is used as a sighting hole at the breech end.

Select a clearly-defined object, at least a mile away, to lay on, and lay the bore of the howitzer on this point.

Dial Sight.

Test.—Set the elevating drum on the sight and the deflection scale reader at zero. The sight tube should be on the object.

Adjustment.—Slacken the locking nut in the dial sight bracket with spanner No. 261. With spanner No. 262 adjust the pillar in its socket by means of the adjusting screw and clamping screw, until the sight tube cross-wires are on the object. With spanner No. 262 still in position on the adjusting screw, again tighten up the locking nut by No. 261. This operation should be carried out with the sight in each of the brackets.

The clamping screw must be clamped tightly before the operation is finished.

No adjustment for elevation is necessary.

Fore and Hind Sights.

Test.—Set all sliding leaves at 3 on the main scales, the deflection scales and the hind sights at zero; the acorn of the fore sight should be on the object when viewed through the notch of the hind sight.

Adjustment.—If considered necessary, move the deflection leaf of either sight until the sights are laid on the object; erase the arrow on the leaf, and re-mark it opposite 3 on main scale.

Test for Straightness of the Cross-bar.—Move the sliding leaves to 6 on main scales. The line of sight should still be on the object.

Adjustment.—Adjust the lower of the two bars until the line of sight is correct.

To Test the Field Clinometer.

Set the clinometer to zero, place it on the clinometer plane and level the gun till the bubble remains central. Turn the clinometer end for end; if the bubble is still central the clinometer is in adjustment, if not, bring the bubble central by moving the slider. Half the readings on the slide will give the error of the clinometer.

A clinometer with an error should be set to this error for testing the sights as above.

*ANCHORAGE.

The following is a system of anchorage which has been found successful :—

Stores required—

- 2 heavy dragropes.
- 3 5-foot pickets.
- 1 maul.
- 5 fathoms of $1\frac{1}{2}$ -inch lashing.

Construct a two-one picket holdfast about 15 feet in front of the howitzer in the line of fire or centre line of the zone.

The two pickets must be driven so that their loops are outwards, the latter being sufficiently clear of the ground to admit of two thicknesses of rope below them.

One heavy dragrope is made into a double sling, the hook being passed into the eye. Place this double sling over the two pickets before lashing them back. Pass the other heavy dragrope over and under the axletree on one side, through the bight of the sling, over and under the axletree on the other side, back through the bight, and finish off by hooking the hook into the eye. Both bights of this dragrope should be close to the breast of the carriage.